Space Weather Forecast

Issued on Sunday, 19 March 2023 at 01:15 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of G1 Minor Storm intervals with Coronal Mass Ejection glance possible day 2 or 3 (20th or 21st) but low confidence. Chance of Moderate flares.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Low over the past 24 hours, with one Common-class flare observed at 18/0716 UTC from a sunspot region located near the southeast limb. There are currently three numbered sunspot regions on the visible disc. The largest and most complex sunspot regions are located near the southeast limb, with more of their complexity becoming apparent as they continue to rotate into view. The remaining sunspots on the disc are small and simple.

A large filament (arc of plasma seen erupting from the Sun) eruption which occurred on the 17th March produced a Coronal Mass Ejection (CME), which has been analysed and results suggest a possible glancing blow at Earth either on late on Day 2 or early Day 3 (20-21 Mar), although most of the material is expected to miss to the south and ahead of Earth. Other small filaments were also observed lifting from the northwest disc during the 17th March, however, no CMEs have been observed. Geomagnetic activity is low confidence due to these eruptions. No other Earth-directed CMEs have been observed in the last 24 hours.

Solar Wind / Geomagnetic Activity: The solar wind speed was slightly elevated at around 400-470 km/s throughout. The interplanetary magnetic field strength was weak, with the north-south directed component variable and also weak. Resultant geomagnetic activity was Quiet to Unsettled (Kp 2-3).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is very near background levels, having continued its decline since the S1/Minor Solar Radiation Storm that occurred earlier this week.

Four-Day Space Weather Forecast Summary

Solar Activity: Low activity is most likely, but with a chance of increasing to Moderate at times with isolated M-flares throughout. These most likely from the larger sunspots in the southeast, or from other regions that are rotating onto the southeast disc, and also onto the northeast disc later in the period.

Solar Wind / Geomagnetic Activity: A glancing CME impact is possible day 2 or early day 3 (20th or 21st), however this is low confidence. This will come alongside a muted connection to the fast winds from a small coronal hole. Geomagnetic activity is expected to be mainly Quiet until this faster wind arrival, then becoming Unsettled with Active intervals likely (Kp 3-4). Any CME arrival will likely increase this further, to Active or G1 Minor Storm intervals (Kp 4-5). Activity then likely easing later day 3 (21st) and day 4 (22nd). However, the large coronal hole

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(CH85/-) currently located in the southeast is likely to bring the next HSS either late on day 4 (22 Mar) or just beyond the forecast period, which is likely to increase geomagnetic activity.

Energetic Particles / Solar Radiation: The count rate of energetic particles is expected to continue very gradually declining to background, with no other significant enhancements currently anticipated. Solar Radiation storms are currently not expected.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	30	20	10
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	30	30	30	30
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	1	1	1	1
Very Active	≥ S3 *	No	1	1	1	1

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Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	1	1	1	1
Very Active	**≥ S3 ***	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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